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Cheston et al.

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(54) **WAKE ON CLOUD**

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G06F 1/26	(2006.01)
H04L 29/08	(2006.01)
G06F 1/32	(2006.01)
H04L 12/12	(2006.01)
G06F 12/00	(2006.01)

(52) **U.S. Cl.**

CPC ***G06F 1/26*** (2013.01); ***G06F 1/3209*** (2013.01); ***H04L 12/12*** (2013.01); ***H04L 29/08072*** (2013.01)

(58) **Field of Classification Search**

USPC 709/203, 223–229, 250

See application file for complete search history.

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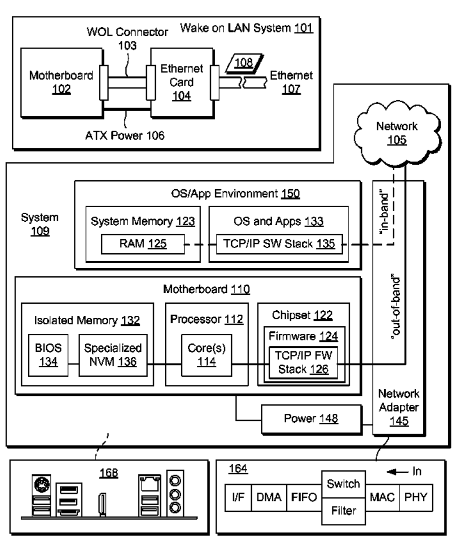
(57) **ABSTRACT**

A method can include receiving a request to access a specified resource associated with a user account; and, in response to the request, transmitting, to a network address associated with the user account, instructions for waking a system or device from a sleep state and for accessing the specified resource. Various other apparatuses, systems, methods, etc., are also disclosed.

19 Claims, 8 Drawing Sheets



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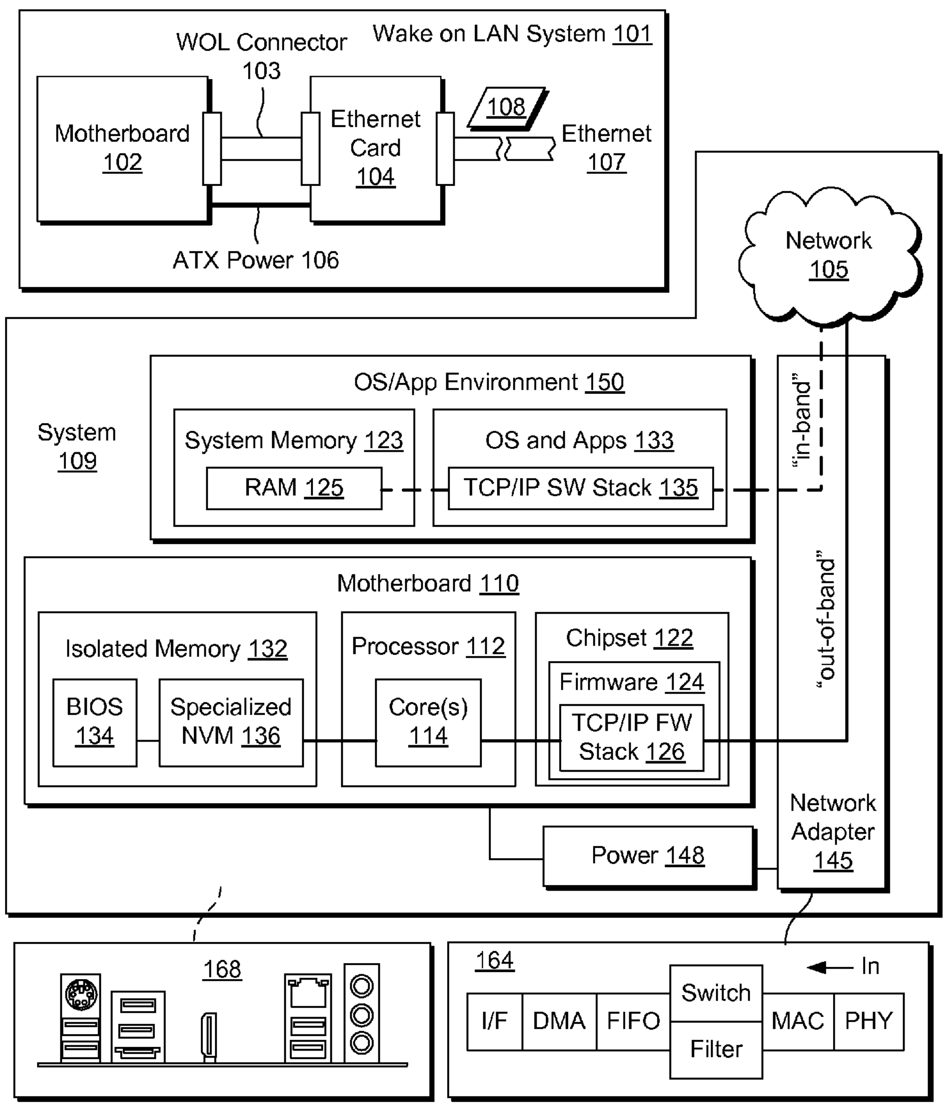
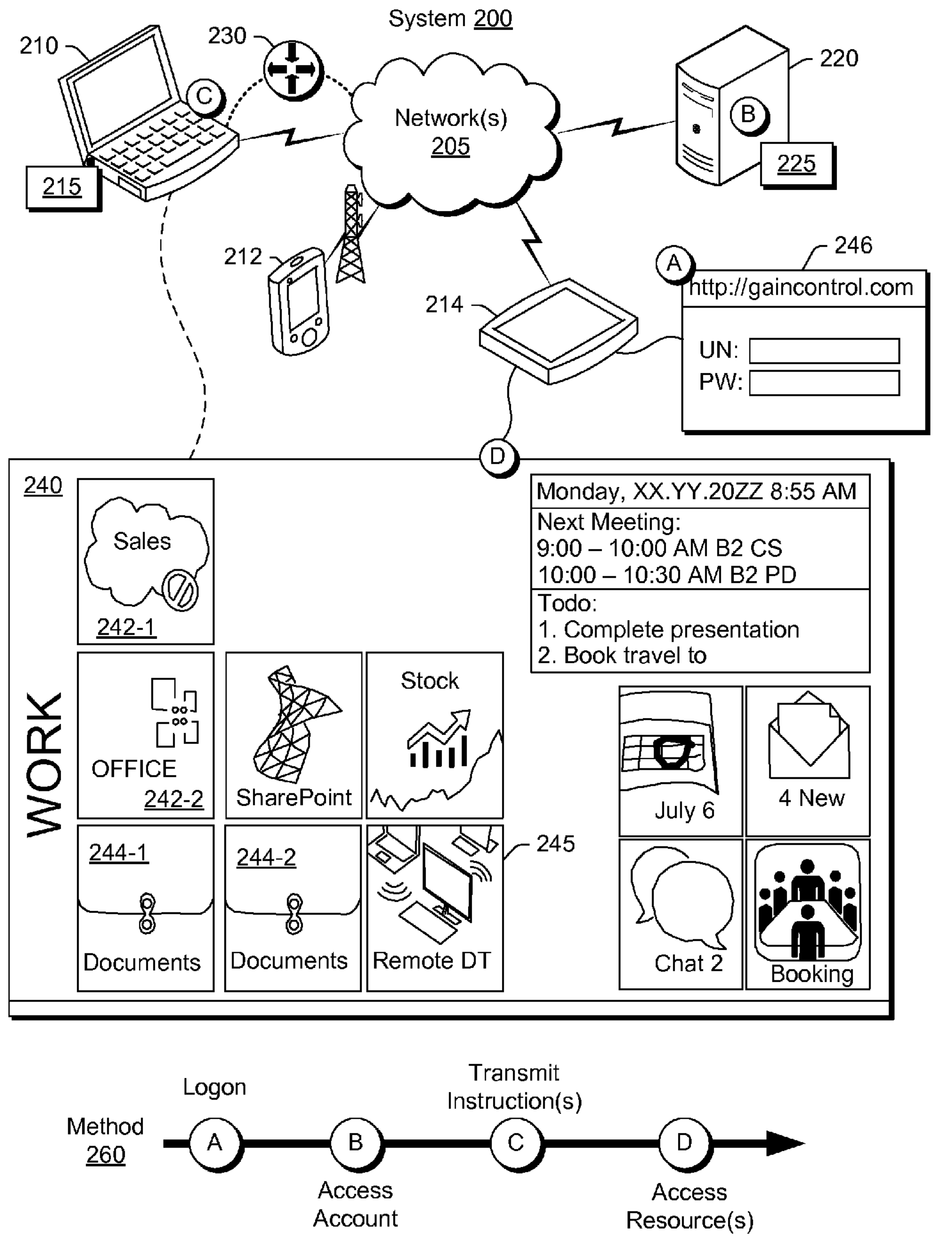


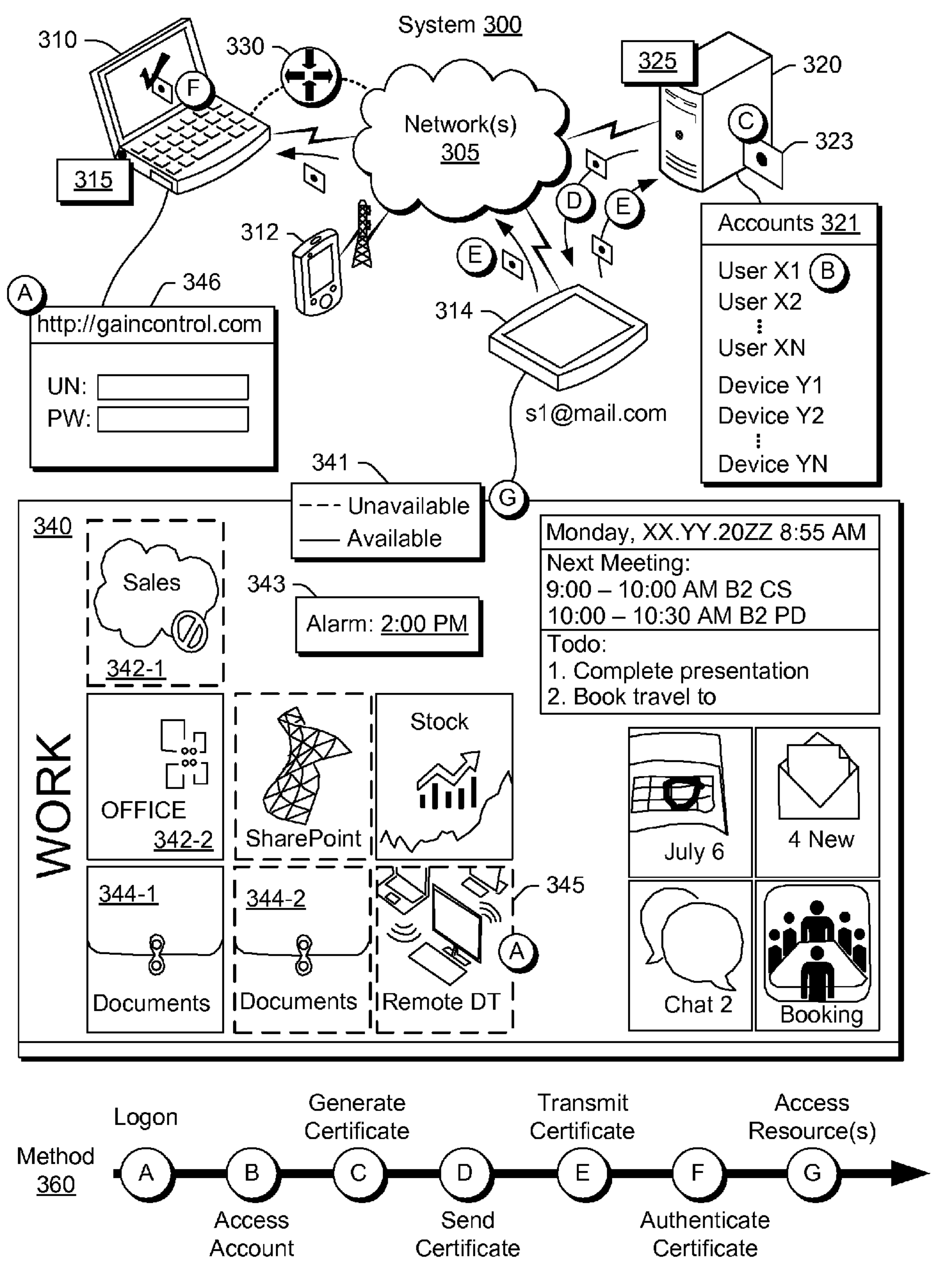
Wake on LAN System 101
WOL Connector 103
Motherboard 102
Ethernet Card 104
108
Ethernet 107
ATX Power 106
Network 105
System 109
OS/App Environment 150
System Memory 123
RAM 125
OS and Apps 133
TCP/IP SW Stack 135
"in-band"
"out-of-band"
Motherboard 110
Isolated Memory 132
BIOS 134
Specialized NVM 136
Processor 112
Core(s) 114
Chipset 122
Firmware 124
TCP/IP FW Stack 126
Network Adapter 145
Power 148
168
164
In
I/F
DMA
FIFO
Switch
Filter
MAC
PHY

FIG. 1



System 200
210
230
C
Network(s) 205
220
B
225
215
212
214
A
246
http://gaincontrol.com
UN:
PW:
D
240
WORK
Sales
242-1
Monday, XX.YY.20ZZ 8:55 AM
Next Meeting:
9:00 – 10:00 AM B2 CS
10:00 – 10:30 AM B2 PD
Todo:
1. Complete presentation
2. Book travel to
OFFICE
242-2
SharePoint
Stock
July 6
4 New
244-1
Documents
244-2
Documents
Remote DT
245
Chat 2
Booking
Method 260
Logon
Access Account
Transmit Instruction(s)
Access Resource(s)

FIG. 2



System 300
310
330
325
320
Network(s)
305
C
323
F
315
312
D
E
E
Accounts 321
User X1
B
User X2
User XN
Device Y1
Device Y2
Device YN
346
A
http://gaincontrol.com
UN:
PW:
314
s1@mail.com
341
Unavailable
Available
G
340
Sales
342-1
343
Alarm: 2:00 PM
Monday, XX.YY.20ZZ 8:55 AM
Next Meeting:
9:00 – 10:00 AM B2 CS
10:00 – 10:30 AM B2 PD
Todo:
1. Complete presentation
2. Book travel to
WORK
OFFICE
342-2
SharePoint
Stock
July 6
4 New
344-1
Documents
344-2
Documents
Remote DT
A
345
Chat 2
Booking
Method
360
Logon
Access Account
Generate Certificate
Send Certificate
Transmit Certificate
Authenticate Certificate
Access Resource(s)
A
B
C
D
E
F
G

FIG. 3

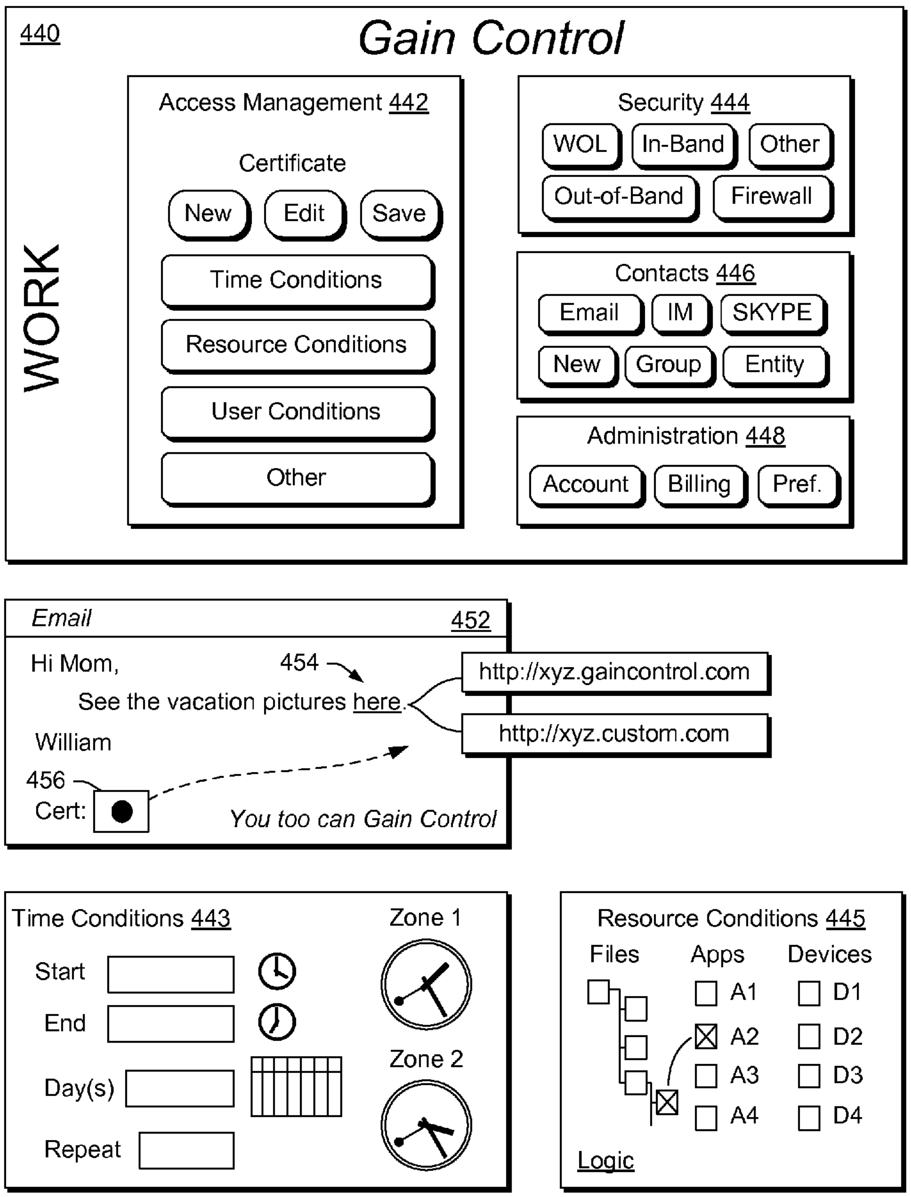

440
Gain Control
WORK
Access Management 442
Certificate
New
Edit
Save
Time Conditions
Resource Conditions
User Conditions
Other
Security 444
WOL
In-Band
Other
Out-of-Band
Firewall
Contacts 446
Email
IM
SKYPE
New
Group
Entity
Administration 448
Account
Billing
Pref.
Email
452
Hi Mom,
454
See the vacation pictures here.
William
456
Cert:
You too can Gain Control
http://xyz.gaincontrol.com
http://xyz.custom.com
Time Conditions 443
Start
End
Day(s)
Repeat
Zone 1
Zone 2
Resource Conditions 445
Files
Apps
Devices
A1
A2
A3
A4
D1
D2
D3
D4
Logic

FIG. 4

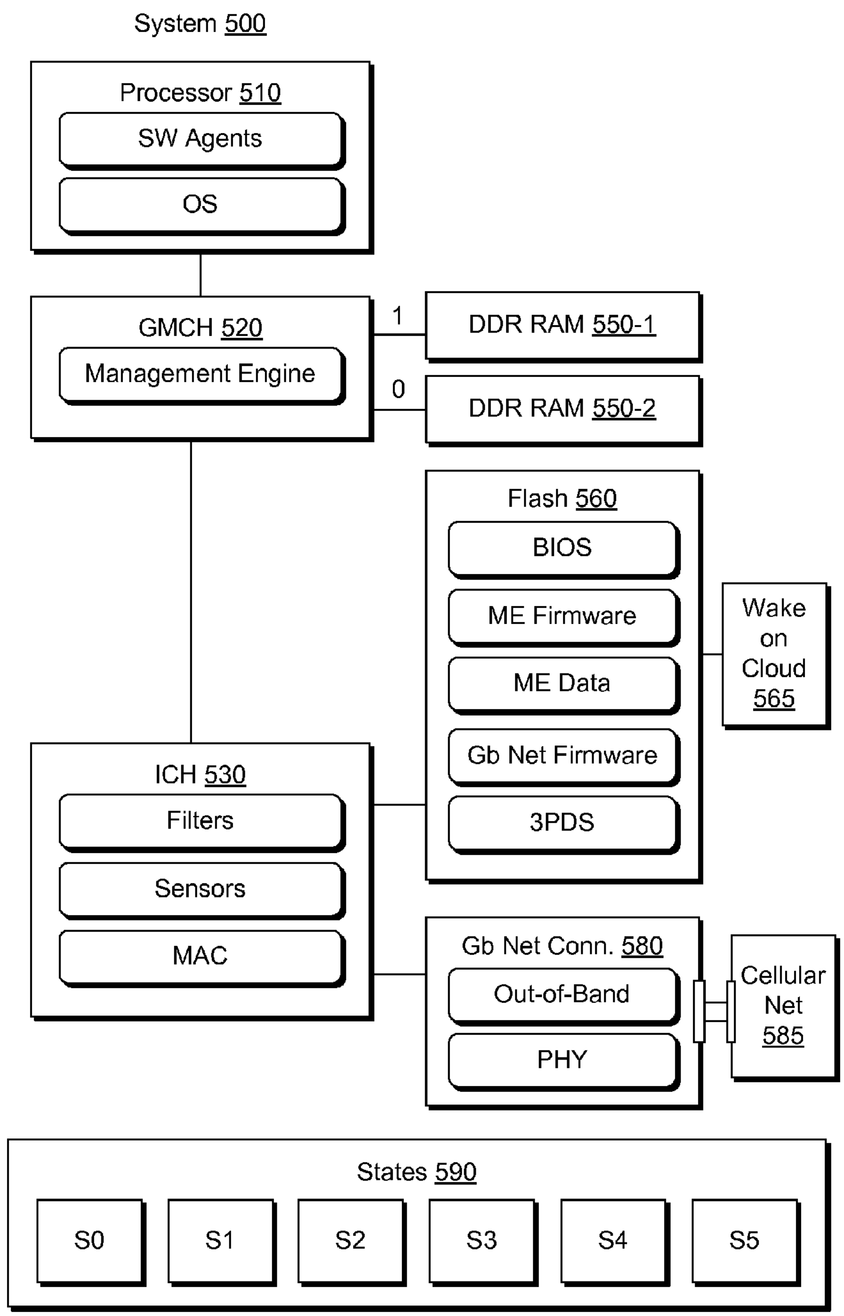

System 500
Processor 510
SW Agents
OS
GMCH 520
Management Engine
1
0
DDR RAM 550-1
DDR RAM 550-2
Flash 560
BIOS
ME Firmware
ME Data
Gb Net Firmware
3PDS
Wake on Cloud 565
ICH 530
Filters
Sensors
MAC
Gb Net Conn. 580
Out-of-Band
PHY
Cellular Net 585
States 590
S0
S1
S2
S3
S4
S5

FIG. 5

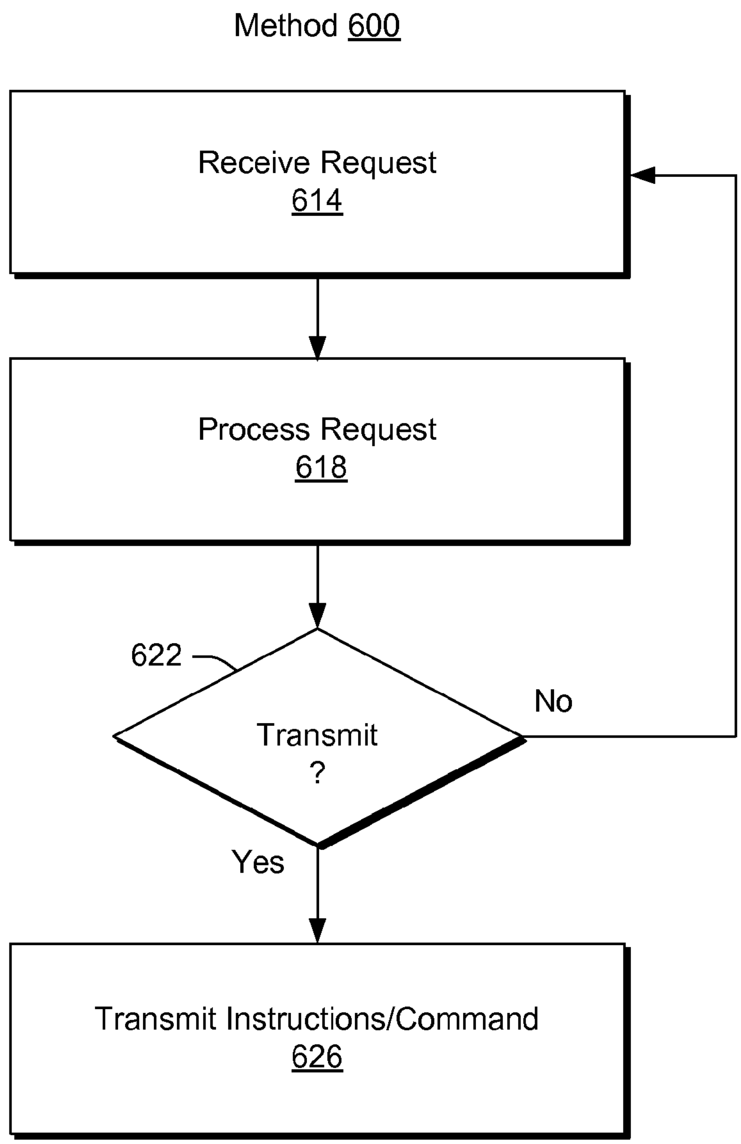

Method 600
Receive Request
614
Process Request
618
622
Transmit
?
No
Yes
Transmit Instructions/Command
626

FIG. 6

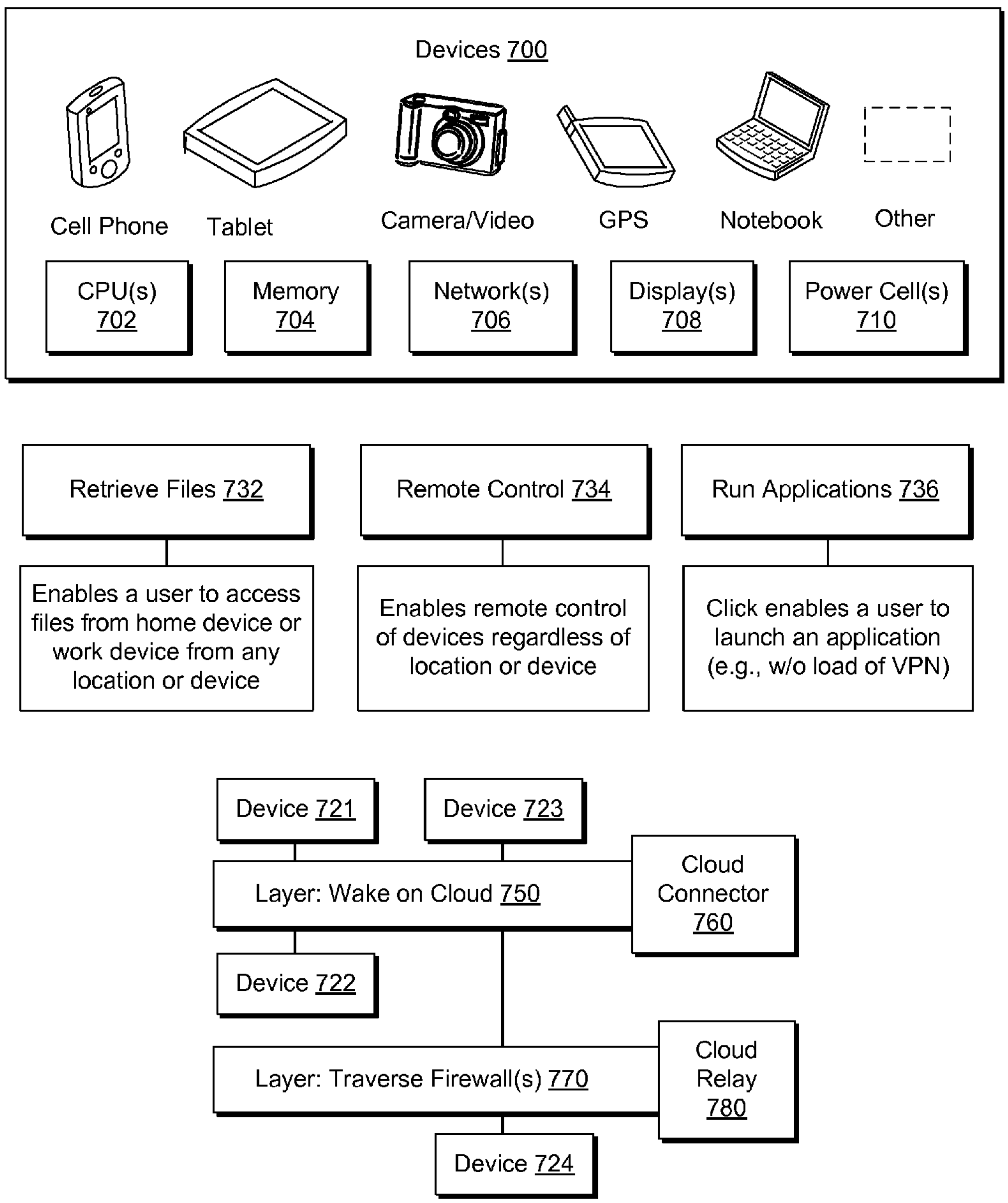
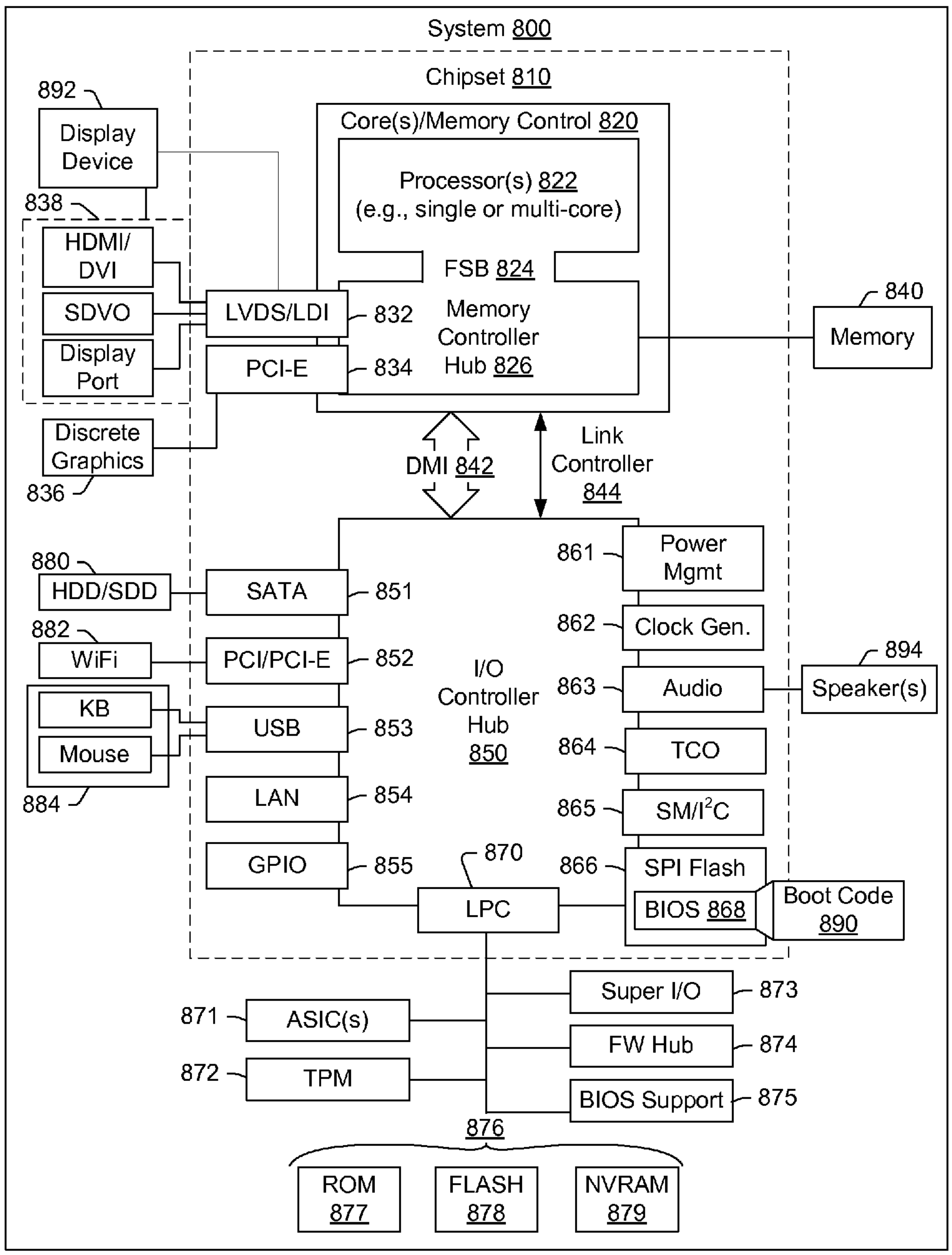

Devices 700
Cell Phone
Tablet
Camera/Video
GPS
Notebook
Other
CPU(s) 702
Memory 704
Network(s) 706
Display(s) 708
Power Cell(s) 710
Retrieve Files 732
Remote Control 734
Run Applications 736
Enables a user to access files from home device or work device from any location or device
Enables remote control of devices regardless of location or device
Click enables a user to launch an application (e.g., w/o load of VPN)
Device 721
Device 723
Layer: Wake on Cloud 750
Cloud Connector 760
Device 722
Layer: Traverse Firewall(s) 770
Cloud Relay 780
Device 724

FIG. 7



System 800
Chipset 810
892
Display Device
838
HDMI/ DVI
SDVO
Display Port
Discrete Graphics
836
Core(s)/Memory Control 820
Processor(s) 822 (e.g., single or multi-core)
FSB 824
LVDS/LDI
832
PCI-E
834
Memory Controller Hub 826
840
Memory
DMI 842
Link Controller 844
880
HDD/SDD
SATA
851
882
WiFi
PCI/PCI-E
852
KB
Mouse
USB
853
884
LAN
854
GPIO
855
I/O Controller Hub 850
861
Power Mgmt
862
Clock Gen.
863
Audio
894
Speaker(s)
864
TCO
865
SM/I2C
866
SPI Flash
BIOS 868
Boot Code 890
870
LPC
871
ASIC(s)
872
TPM
Super I/O
873
FW Hub
874
BIOS Support
875
876
ROM 877
FLASH 878
NVRAM 879

FIG. 8

WAKE ON CLOUD

TECHNICAL FIELD

Subject matter disclosed herein generally relates to technologies and techniques for accessing remote resources.

BACKGROUND

A user may desire access to a work computer while at home. In such a situation, a virtual private network (VPN). A VPN extends a private network and the resources contained in the network across public networks like the Internet. It enables a host computer to send and receive data across shared or public networks as if it were a private network with all the functionality, security and management policies of the private network. A VPN establishes a virtual point-to-point connection through the use of dedicated connections, encryption, or a combination of the two. Various technologies and techniques described herein can provide for access to remote resources.

SUMMARY

A method can include receiving a request to access a specified resource associated with a user account; and, in response to the request, transmitting, to a network address associated with the user account, instructions for waking a system or device from a sleep state and for accessing the specified resource. Various other apparatuses, systems, methods, etc., are also disclosed.

BRIEF DESCRIPTION OF THE DRAWINGS

Features and advantages of the described implementations can be more readily understood by reference to the following description taken in conjunction with the accompanying drawings.

FIG. **1** is a diagram of an example of a wake on LAN system and an example of a system configured for in-band and out-of-band communication paths;

FIG. **2** is a diagram of an example of a system and an example of a method;

FIG. **3** is a diagram of an example of a system and an example of a method;

FIG. **4** is a diagram of examples of graphical user interfaces;

FIG. **5** is a diagram of an example of a system;

FIG. **6** is a diagram of an example of a method;

FIG. **7** is a diagram of examples of devices, functional blocks and an architecture that includes a wake on cloud layer and a firewall traversal layer; and

FIG. **8** is a diagram of an example of a machine, some or all of the features thereof may form part or all of a client, a server or other device or system.

DETAILED DESCRIPTION

The following description includes the best mode presently contemplated for practicing the described implementations. This description is not to be taken in a limiting sense, but rather is made merely for the purpose of describing general principles of the implementations. The scope of the described implementations should be ascertained with reference to the issued claims.

FIG. **1** shows an example of a system **101** and an example of a system **109**. The systems **101** and **109** are configured for network communication. The system **101** may be referred to as a wake on LAN system ("WOL"). As shown in the example of FIG. **1**, the system **101** includes a motherboard **102**, a WOL connector **103** to an Ethernet card **104** (e.g., a network interface card or NIC), and a power connection **106** (e.g., according to a specification such as AT, ATX, etc.). Where the system **101** is connected to an Ethernet **107**, a so-called "magic" packet **108** may be transmitted and received by the Ethernet card **104**, which, in turn, may communicate with the motherboard **102**. Where circuitry of the motherboard **102** is in a sleep state, receipt of the magic packet **108** by the Ethernet card **104** may result in one or more actions to change the state of the circuitry of the motherboard **102**.

As inferred by the term "wake on LAN" (WOL), the Ethernet **107** is a local area network (LAN). For the system **101**, identification information (e.g., an IP address, etc.) may be stored in memory on Ethernet card **104**. In such an example, the power connection **106** may provide about 600 mA of standby current to support functions of the Ethernet card **104** that allow it to receive the magic packet **108**.

The magic packet **108** is a particular type of network message that includes a MAC address for a destination system. Power provided to the Ethernet card **104** allows it to perform "listening" operations for the system **101**, where once it "hears" a magic packet addressed to it, the Ethernet card **104** commences a system wake-up process for the system **101** via communication of information via the WOL connector **103**.

The aforementioned listening and hearing process may also be referred to as "sniffing". As an example, consider a packet analyzer (e.g., network analyzer, protocol analyzer, packet sniffer, Ethernet sniffer, wireless sniffer, etc.) as circuitry (e.g., code/hardware, hardware, etc.) that can intercept and log traffic passing over a digital network or part of a network. As data streams flow across the network, the sniffer captures each packet and, if appropriate, decodes the packet's raw data, showing the values of various fields in the packet, and analyzes its content (e.g., according to an appropriate RFC specification, etc.).

As to the magic packet **108**, it may be a broadcast frame that includes in its payload 6 bytes of all 255 (FF FF FF FF FF FF in hexadecimal), followed by sixteen repetitions of a target system's 48-bit MAC address (e.g., for a total of 102 bytes). As an example, a magic packet is scanned for such a string and, it may not be parsed (e.g., by a full protocol stack), as such, it may be sent as any network- and transport-layer protocol (e.g., consider sending as a UDP datagram to port 7 or 9, or directly over Ethernet as EtherType 0x0842).

A magic packet may include, in addition to a MAC address, a credential, such as a password. A magic packet normally does not provide for delivery confirmation and it may not operate outside of a local area network (LAN). As an example, a wireless interface such as a 802.11 wireless interface may not have access to power in various sleep states of a system and, as such, may not be available for receipt of a magic packet.

As to a MAC address, the acronym MAC stands for Media Access Control, as a sublayer of the multiple Ethernet sublayers: PHY (physical), MAC, and LLC (logical). An Ethernet address may be considered as being part of the MAC sublayer. As an example, the physical layer may be responsible for the "wire" while the MAC may be responsible for formatting data that goes on the wire. The logical layer may be considered as being responsible for tasks such as retransmitting data on the wire.

An Ethernet MAC address may be a 48 bit number composed of a 24-bits to identify a vendor of an Ethernet card and 24-bits as a serial number assigned to the Ethernet card by the vendor. Such an approach acts to avoid two Ethernet cards having the same MAC address. Another term used for the MAC address is "organizationally unique identifier" (OUI), which has a bit to indicate if an address is a "broadcast/multicast" address and a bit to indicates if an Ethernet card (e.g., a network adapter) has been reassigned a locally administered address (e.g., where a network administrator reassigns the MAC address to fit some policy). As an example, consider a MAC address 03 00 00 00 00 01 on a wire where the first byte contains the binary representation of 00000011 where both these special bits are set (and the rest are zero). This is a special multicast packet that is sent to all machines that run the NetBEUI protocol (e.g., as may be installed on WINDOWS® OS systems to share files locally without using TCP/IP as the transport).

Referring again to the system **101**, the magic packet **108** may be sent by a device on a data link or layer 2 in an OSI model and broadcast to all Ethernet cards (e.g., NICs) using the network broadcast address; noting that in such an example the IP-address (layer 3 in the OSI model) is not used.

For the wake on LAN system **101** to operate, as mentioned, at least some of the components of the Ethernet card **104** need to be powered. As an example, where a system is configured to be powered in the short-term by battery power, a wake on LAN feature may be disabled when the system is powered by battery (e.g., according to a default configuration, a policy, etc.).

A wake on LAN implementation may be relatively simple for quick processing by circuitry of an Ethernet card with minimal power requirement. In the example of FIG. **1**, the wake on LAN system **101** operates "below" an IP protocol layer, thus, the MAC address is required; noting that IP addresses and DNS names may be meaningless to such a system.

The wake on LAN system **101** is implemented using various components including the motherboard **102** (e.g., BIOS) and the Ethernet card **104** (e.g., firmware) and, as shown, not dependent on an operating system; not dependent on Ethernet card drivers (e.g., NIC drivers) running on hardware. As an example, a motherboard with an embedded Ethernet controller configured to support WOL may not need a cable (see, e.g., the WOL connector **103**); however, it will require power (e.g., per an ATX specification).

As to the system **109**, it connects to a network **105** (e.g., the Internet, etc.) via a network adapter **145** powered by a power source **148** and includes a so-called out-of-band communication path and a so-called in-band communication path. In the example of FIG. **1**, the network **105** may include one or more of the Internet (e.g., where communication may occur via one or more Internet protocols), a cellular network, a satellite network, etc.

As shown in the example of FIG. **1**, the out-of-band communication path operates with respect to components on a motherboard **110** while the in-band communication path operates with respect to an OS/application environment **150**. As shown, the motherboard **110** includes a processor **112** with one or more cores **114**, a chipset **122** with firmware **124** that supports a TCP/IP firmware stack **126**, and isolated memory **132**, which includes BIOS **134** and specialized non-volatile memory **136**, for example, to store particular information that may support the out-of-band communication path. The OS/application environment **150** includes system memory **123** with random access memory **125** and an operating system and one or more applications **133** along with a TCP/IP software stack **135**.

As to the network adapter **145**, it may be supplied with power (e.g., via the power source **148** or another power source), for example, with a standby line capable of providing adequate standby current. As an example, the network adapter may include a low power, chip-based architecture. As an example, a network adapter may be configured for power with one or more rails (e.g., a 3.3 V rail, a 1.9 V rail, a 1.05 V rail, etc.). As an example, power consumption for a state "S0" (see, e.g., further below for description of some power states) in a maximum 1000Base-T active mode, at about 90° C. may be about 900 mW (e.g., depending on power configuration). In an "idle" mode, power consumption may be less and, for example, for a wake-on-LAN 100 Mb/s mode (e.g., D3 cold state, see, e.g., various "SX" power states), it may be about 200 mW or less and even less with a lesser data rate (e.g., 10 Mb/s); with wake-on-LAN disabled, power consumption may be about 35 mW. As an example, for 1.05 V DC rail, power consumption for a wake-on-LAN 100 Mb/s mode may be about 170 mW at a current of about 25 mA. Power consumption may be available from a network adapter, for example, in a set number of units (e.g., per 100 mW blocks).

As an example, "sleep" may define a low power consumption mode or state that may provide for an operational configuration (e.g., open apps, cursor position, etc.) of a system or device to be restored from powered memory (e.g., consider an "S3" state). As an example, a sleep state may be a deeper sleep state where an operational configuration (e.g., open apps, cursor position, etc.) of a system or device to be restored is restored from a component such as a hard drive, which may take longer than being restored from powered memory, but which may consume less power while asleep. In the foregoing examples, for the low power consumption modes or states, power is provided to circuitry to provide to "sniff" a network (e.g., for packet inspection).

A network adapter may include memory with an Ethernet individual address (IA), for example, as a 6-byte field that may be unique for the adapter. As an example, a nine-digit printed board assembly (PBA) number may be included in a network adapter, for example, in memory (e.g., EEPROM).

As an example, the network adapter **145** may be a LAN subsystem PCI bus network adapter configured to monitor network traffic, for example, at a so-called Media Independent Interface. Upon detecting a particular packet frame (e.g., in a "magic" packet), network adapter **145** may assert a wake-up signal, for example, that powers up a device (e.g., an information handling device such as a computer). While a magic packet is mentioned, wake capabilities may occur, for example, responsive to receipt of a PCI Express WAKE# signal, a ping, etc. For example, reception of a network wake-up packet (e.g., magic or other), detection of a link change of state, etc. may result in waking. While LAN is mentioned, as an example, a signal (e.g., a command, a packet or other information) may be received via cellular circuitry, infra-red circuitry or other type of communication circuitry.

As an example, the network adapter may include various feature, for example, a network adapter may include a Gigabit Ethernet controller, a RJ-45 LAN connector, a CSMA/CD protocol engine, a LAN connect interface between a PCH and a LAN controller, PCI bus power management, ACPI technology support, LAN wake capabilities, ACPI technology support, LAN subsystem software, etc.

As an example, a network adapter may be IEEE 802.3 compliant, Energy Efficient Ethernet (EEE) IEEE802.3az supported (e.g., Low Power Idle [LPI] mode), dual interconnected between an integrated LAN controller and a Physical Layer (PHY), PCI Express-based interfaced for active state operation (S0) state, SMBUS connected for host and management traffic (Sx low power state), compliant to IEEE

802.3x flow control support, supportive of 802.1p and 802.1q, and supportive of TCP, IP, and UDP checksum offload (e.g., IPv4 and IPv6), etc.

As an example, a network adapter may be chip-based with compact, low power components with Gigabit Ethernet Media Access Control (MAC) and Physical Layer (PHY) port. Such a network adapter may use the PCI Express (PCIe) architecture, for example for implementation as a LAN on a motherboard (LOM) configuration or, for example, embedded as part of a switch add-on card, a network appliance, etc.

FIG. **1** shows an example of a network adapter architecture **164** with various components that may be included in a network adapter such as the network adapter **145**. In such an example, packet reception may include recognizing the presence of a packet on a "wire", performing address filtering, storing the packet in a receive data FIFO, transferring the data to a receive queue in host memory, and updating the state of a receive descriptor. As to filtering, for example, consider an exact unicast/multicast where a destination address must exactly match one of a plurality of stored addresses (e.g., unicast and/or multicast addresses). In a multicast scenario, as an example, upper bits of an incoming packet's destination address index may be a bit vector for indicating whether to accept the packet. As another example, a VLAN filter mode may be supported. As an example, a filter may check a MAC destination address for validity (e.g., such as, IA match, broadcast, multicast, etc.). As an example, a SNAP/VLAN filter may check next headers looking for an IP header and be capable of decoding, for example, Ethernet II, Ethernet SNAP, and IEEE 802.3ac headers. As an example, filters may include IPv4, IPv6, UDP/TCP, etc. While receipt is shown in the architecture **164**, transmission may occur in via a network adapter. FIG. **1** also shows some examples of connectors **168**, for example, as associated with a motherboard such as the motherboard **110**, for example, including the network adapter **145** as an "on-board" feature.

As an example, a method may include reading the power management enable bits from a NVM initialization control word into power management enable bits of a wake-up call (WUC). Such bits may control enabling of a power management wake-up. As an example, a wake-up may be multi-tiered, for example, implementing a filter to recognize information as associated with a destination and a subsequent (or parallel) filter to recognize a wake-up command. As an example, a filter may be pre-defined, flexible, etc. As an example, data of a packet that passes recognition and wake-up filters may include information that may be stored to memory of a network adapter (e.g., some number of bytes in an internal buffer, etc.), which, for example, may be read from the memory after a system wakes up. As an example, such information may indicate what resource or resources may be available via a system after its waking (see, e.g., FIGS. **2**, **3**, **4**, etc.). As an example, waking may occur via one or more instructions submitted via a PCI or other type of interface. As an example, instructing as to resource availability may occur via one or more instructions submitted via a PCI or other type of interface.

In the example of FIG. **1**, the in-band communication path goes through the software stack **135** (e.g., as provided by an operating system) and is secured via operating system and software-based security applications; whereas, the out-of-band communication path (e.g., tunnel) sits "below" the OS/application environment **150** and goes through the TCP/IP firmware stack **126** and is secured with hardware-based transport layer security (TLS) encryption and, for example, one or more other robust methodologies and technologies.

As an example, the motherboard **110** may include components such as those marketed by Intel Corporation (Santa Clara, Calif.). As an example, one or more components may support the Intel® Active Management Technology (AMT), as a hardware-based technology for remotely managing and securing computing systems in out-of-band operational modes. Intel® AMT is a set of remote management and security features designed into hardware that can, for example, allow a system administrator with AMT security privileges to access system information and perform specific remote operations on a system that includes the hardware. As an example, such remote operations may include remote power up/down (e.g., via wake on LAN), remote/redirected boot (e.g., via integrated device electronics redirect, or IDE-R), console redirection (e.g., via serial over LAN), and other remote management and security features.

As an example, a network adapter may include one or more features of an Intel® Ethernet controller, for example, as described in a document entitled "Intel® 82583V GbE Controller" (Rev. 2.5, June 2012), which is incorporated by reference herein.

As an example, out-of-band communication may be performed using AMT and, for example, a management engine such as the Intel® Management Engine (ME). The Intel® ME provides access to Intel® AMT features where AMT communication depends on the state of the ME, not the state of an OS. As part of the Intel® ME, an AMT out-of-band communication channel is based on a TCP/IP firmware stack designed into hardware. Because it is based on the TCP/IP stack, remote communication with AMT occurs via the network data path (e.g., before communication may be passed to the OS).

As an example, AMT out-of-band communication may be via wire or wireless (e.g., the Intel® AMT supports wired and wireless networks). For wireless devices on battery power, out-of-band communication may be available when the device is in an "awake" state, connected to a network (e.g., even if its OS is down). Out-of-band communication may also available for wireless or wired devices connected to a network over a host OS-based virtual private network (VPN) when awake and working properly.

As an example, AMT out-of-band secure communication may occur outside a firewall. For example, a secure communication tunnel may be established between a wired device and an IT console outside a firewall. In such a scheme, a management presence server (e.g., a "vPro-enabled gateway") may authenticate a device, open a secure TLS tunnel between the IT console and the device, and mediate communication. Such a scheme may help a user or device itself request maintenance or service, for example, when at a satellite office, etc., for example, where there is no on-site proxy server or management appliance. As an example, a device may include Intel® vPro technology or other technology that supports 802.1x, Cisco® Self-Defending Network, Microsoft® Network Access Protection, etc., for example, to access one or more resources in a secure network environment(s).

As an example, a device that includes AMT may store configuration information in protected memory (see, e.g., the isolated memory **132**, particularly the specialized NVM **136**). The information may include the name(s) of appropriate "whitelist" management servers (e.g., for a company, etc.). When a user tries to initiate a remote session between the wired AMT device and a server from an open LAN, AMT sends the stored information to a management presence server (MPS) in a so-called "demilitarized zone" that exists between the firewall and device's firewalls. The MPS can use such information to help authenticate the device. The MPS then mediates communication between the device and management servers.

Where communication is authenticated, a secure communication tunnel can then be opened using TLS encryption. Once secure communications are established between an IT console and Intel® AMT on a device, a system administrator may use the AMT features to remotely diagnose, repair, maintain, or update the device.

In the example of FIG. **1**, the specialized NVM **136** may include information (e.g., instructions) for technology such as the Intel® AMT. As an example, a module may be loaded into the isolated memory **132**, optionally the specialized NVM **136**, for purposes of allowing access to one or more resources available on, through or on and through a system that includes components for out-of-band operations.

FIG. **2** shows an example of a system **200** with respect to one or more networks **205** for communication of information, for example, between a device **210**, a device **212**, a device **214** and a device **220**. As an example, one or more firewalls and/or other network devices **230** may be included. In the example of FIG. **2**, the network **205** may include one or more of the Internet (e.g., where communication occurs via one or more Internet protocols), a cellular network, a satellite network, etc. FIG. **2** also shows a method **260** along with labels A, B, C, and D.

As shown, the method **260** includes a logon process (A), for example, where a user on the device **214** accesses a webpage **246** via the one or more networks **205**, for example, where the webpage **246** is hosted by or otherwise associated with a service **225** on the device **220** (e.g., a server, etc.). As an example, the device **214** may include a browser application that launches or is directed to a URL for the webpage **246**. As an example, the device **210** may include code **215** associated with the service **225** on the device **220**. As an example, the code **215** may be stored in non-volatile memory and may assist with an out-of-band communication mode. As an example, code **215** may be code for a filter (e.g., a flexible filter) and, for example, code to instruct the device **210** to read memory of a network adapter (e.g., an internal buffer) for stored data as included in a packet. Such data may indicate to the device what resource or resources may be made available via the network connection.

As shown, the webpage **246** may include fields for entry of a user name and a password to logon to the service **225** of the device **220**. While the example of FIG. **2** shows the device **220** as a single unit, it may be composed of multiple units (e.g., a number of blades in a server farm). As an example, the device **220** may be a "cloud-based" device in a distributed environment where various devices, components, etc. interact for purposes of data storage, communications, computing, etc.

In the example of FIG. **2**, the logon process (A) of the method **260** provides for accessing a user account (B) for the service **225** of the device **220**. The user account can include information associated with the device **210**, for example, to allow a user at the device **214** (e.g., or another device) to gain access to one or more resources available on, through or on and through the device **210**. For example, the service **225** of the device **220** may transmit one or more instructions via the one or more networks **205** to the device **210** to commence an out-of-band process using code **215** to provide the user at the device **214** access to one or more resources available on, through or on and through the device **210**. As to the method **260**, a process labeled (C) represents transmission and receipt of one or more instructions and a process labeled (D) represents access to one or more resources.

As an example, a method can include receiving a request to access a specified resource associated with a user account and, in response to the request, transmitting, to a network address associated with the user account, instructions for waking a system or device from a sleep state and for accessing the specified resource. For example, the service **225** may receive a request to access a specified resource associated with a user account and, in response, the service **225** may call for transmitting, to a network address associated with the user account (e.g., a network address for the device **210**), instructions for waking a system or device (e.g., the device **210**) from a sleep state and for accessing the specified resource (e.g., a file, an application, an operating system, a peripheral, etc.).

In the example of FIG. **2**, the user of the device **214** may gain access to one or more resources available on, through or on and through the device **210**. As an example, access may be achieved, at least in part, by an out-of-band wake-up process, for example, when the device **210** is in a particular state (e.g., in one or more states of a group of states). For example, the device **210** may be plugged-in to an electrical power outlet (e.g., of a building, a vehicle, etc.) yet in a low power state that provides a limited supply of power for maintaining activity of a network adapter. Such activity may be sniffing activity that sniffs network packets for information such as a MAC address associated with the device **210**. Upon discovery of such a packet (e.g., a type of "magic" packet), information in the module **215** may be implemented to "wake" the device **210** to a state that allows the user of the device **214** to access one or more resources.

In the example of FIG. **2**, a desktop **240** is shown as including various desktop icons and other desktop information. For example, an icon **242-1** and an icon **242-2** are associated with applications (e.g., available as a resource to the user of the device **214**). Also shown in the example of FIG. **2**, a folder icon **244-1** and a folder icon **244-2**, which may be associated with information (e.g., documents, etc.) available to the user of the device **214**.

As an example, the system **200** may include one or more firewalls, etc. (see, e.g., the network device **230**). As an example, a firewall may be configured for sniffing and associating an address with one or more resources behind the firewall (e.g., by applying one or more filters). In such an example, the firewall may act to direct traffic (e.g., packets, transmitted certificates, etc.) to appropriate destinations behind the firewall. In such an example, an out-of-band process may be performed on a device behind the firewall upon receipt of a packet of information (e.g., appropriate identifying information, instructions, etc.).

As an example, a firewall may be a network device that includes circuitry for various operations associated with traffic control (e.g., a network gateway server may be configured to function as a firewall). As an example, a firewall may include circuitry for stateful packet inspection (SPI), deep packet inspection (DPI), network address translation (NAT, e.g., to "hide" addresses of devices "behind" the firewall, which may be on a private network), etc.

As an example, a network device such as a firewall may include an inspection engine. In a so-called fast path, when a user establishes a connection, a packet may be checked against one or more access lists, if appropriate, address translation may occur and an entry made for a fast path session to allow further packets to bypass checks that may result in delays. As an example, an application may embed an IP address in the packet that should match a source address that is normally translated when it goes through a network device. In such an example, an inspection engine may translate an embedded address and update any checksum or other fields that may be affected by the translation. As an example, for a service that uses dynamically assigned ports, a network device may monitor a session to identify a dynamic port assignment and permit data exchange on such a port for duration of a session.

As an example, one or more devices may include circuitry for cellular communications (e.g., GSM, satellite, etc.). As an example, a network device may include a general packet radio service (GPRS) tunneling protocol (GTP) inspection engine. As an example, GPRS may provide for connectivity for mobile subscribers between one or more GSM networks and a corporate network, the Internet, etc. As an example, a network device (e.g., a gateway GPRS support node "GGSN") may be an interface for communications between a GPRS wireless data network and one or more other networks. Such a device may include an inspection engine for inspecting packets, for example, packets that may include information associated with a service such as the service **225**.

FIG. **3** shows an example of a system **300** with respect to one or more networks **305** for communication of information, for example, between a device **310**, a device **312**, a device **314** and a device **320**. As an example, one or more firewalls and/or other network devices **330** may be included. In the example of FIG. **3**, the network **305** may include one or more of the Internet (e.g., where communication occurs via one or more Internet protocols), a cellular network, a satellite network, etc. FIG. **3** also shows a method **260** along with labels A, B, C, D, E, F and G.

As shown, the method **360** includes a logon process (A), for example, where a user on the device **310** accesses a webpage **346** via the one or more networks **305**, for example, where the webpage **346** is hosted by or otherwise associated with a service **325** on the device **320** (e.g., a server, etc.). As an example, the device **310** may include a browser application that launches or is directed to a URL for the webpage **346**, for example, upon selection and activation of an icon such as the icon **345** (e.g., a desktop icon). In such an example, the icon **345** may include the web address (e.g., a URL) as well as other information, for example, for assisting with access to one or more resources available on or through the device **310** (e.g., one or more files, applications, printers, control systems, etc.). For example, the device **310** may include code **315** associated with the service on the device **320**. As an example, the code **315** may be stored in non-volatile memory and may assist with an out-of-band communication mode. As an example, code **315** may be code for a filter (e.g., a flexible filter) and, for example, code to instruct the device **310** to read memory of a network adapter (e.g., an internal buffer) for stored data as included in a packet. Such data may indicate to the device what resource or resources may be made available via the network connection.

As shown, the webpage **346** may include fields for entry of a user name and a password to logon to the service **325** of the device **320**. As an example, the webpage **346** may provide for loading a certificate or other credential to be authenticated prior to gaining access to one of a plurality of user accounts **321** associated with the service **325** on the device **320**. While the example of FIG. **3** shows the device **320** as a single unit, it may be composed of multiple units (e.g., a number of blades in a server farm). As an example, the device **320** may be a "cloud-based" device in a distributed environment where various devices, components, etc. interact for purposes of data storage, communications, computing, etc.

In the example of FIG. **3**, the logon process (A) of the method **360** provides for accessing a user account (B) for the service **325** of the device **320**. In turn, the user may transmit one or more instructions from the device **310** via the one or more networks **305** to instruct the service **325** to generate a certificate **332**, labeled as process (C) of the method **360**. Further, the user may instruct the service **325** of the device **320** to send the certificate **332** to a particular address available via the one or more networks **305**. For example, the device **320** may receive an instruction associated with a destination and then transmit the generated certificate **332** to that destination, labeled as process (D) in the method **360**.

As an example, consider a user at the device **310** instructing the service **325** at the device **320** to send the certificate **332** to an email address "s1@mail.com". As shown, a user using the device **314** may receive the certificate **332** as an attachment to an email. In turn, the user may use the certificate **332** to gain access to one or more resources available on, through or on and through the device **310**. For example, a recipient of the certificate **332** may transmit the received certificate **332** via the one or more networks **305** to the device **320** hosting the service **325** or to the device **310**, in either instance, to ultimately gain access to one or more resources available on, through or on and through the device **310**. As shown, for the method **360**, the transmission process is labeled as process (E). In the former, the device **320** may be a primary mediator for access (e.g., to authenticate all or a portion of the certificate, the transmitter's address, etc.) while in the latter, the device **310** may be configured to allow access, optionally without further involvement from the device **320** (e.g., or any other device associated with the service **325**).

As an example, the device **310** may be configured to authenticate the certificate **332**, for example, as part of an out-of-band process (e.g., in a secure manner that does not include accessing an operating system). In such an example, authentication may be performed wholly on the device **310** or optionally, at least in part, via an authentication party, for example, accessible via the one or more networks **305**. As shown, for the method **360**, the authentication process is labeled as process (F).

Upon authentication of the certificate **332**, the user of the device **314** may gain access to one or more resources available on, through or on and through the device **310**. As an example, access may be achieved, at least in part, by an out-of-band wake-up process, for example, when the device **310** is in a particular state (e.g., in one or more states of a group of states). For example, the device **310** may be plugged-in to an electrical power outlet (e.g., of a building, a vehicle, etc.) yet in a low power state that provides a limited supply of power for maintaining activity of a network adapter. Such activity may be sniffing activity that sniffs network packets for information such as a MAC address associated with the device **310**. Upon discovery of such a packet (e.g., a type of "magic" packet), information in the module **315** may be implemented to "wake" the device **310** to a state that allows the user of the device **314** to access one or more resources, which may be specified in information included with the certificate **332** or, for example, optionally pre-specified on the device **310** (e.g., according to a policy, a registry for users, permissions, etc.). As shown, for the method **360**, the access process is labeled as process (G).

In the example of FIG. **3**, a desktop **340** is shown as including various desktop icons and other desktop information. For example, an icon **342-1** is associated with an application that is unavailable as a resource to the user of the device **314** while an icon **342-2** is associated with an application that is available as a resource to the user of the device **314**. Also shown in the example of FIG. **3**, a folder icon **344-1** is associated with information (e.g., documents, etc.) that is available to the user of the device **314** while a folder icon **344-2** is associated with information (e.g., documents, etc.) that is unavailable to the user of the device **314**. To assist a "remote" user, the desktop **340** may include a graphic **341** that indicates availability, unavailability or both of one or more resources (see, e.g., dashed lines of unavailable and solid lines for available).

In the example of FIG. **3**, one or more resources are available (or unavailable) to a proper holder of the certificate **332**. Accordingly, while the example of FIG. **3** shows the device **314** as transmitting the certificate **332**, a user may forward the certificate **332**, for example, to the device **312** such that the device **312** may access one or more resources available on, through or on and through the device **310**. As an example, such forwarding may be restricted, for example, where authentication of the certificate **332** depends on information of the transmitter (e.g., requester). For example, the certificate **332** may include one or more geographic conditions that restrict authentication to devices with addresses in a certain country or countries.

In the example of FIG. **3**, the desktop **340** may include a notification graphic **343**. For example, where access is restricted based on time, the notification graphic **343** may be an alarm graphic that indicates when access will be terminated. As an example, such a graphic may provide a graphical user interface to communicate with an "owner" of the device **310**, for example, to modify, shorten or extend a "session". Consider a remote user that needs more time to complete a task. In such an example, the user may activate a GUI for issuing a request to extend a time period. In turn, the owner may intervene, for example, by logging on to the service **325** and issuing a new or a supplemental certificate, which may optionally be transmitted directly to the device **310** (e.g., via the one or more networks **305**). Such an example may correspond to a "super-user" override mode of the service, which may operate in near real-time to modify, shorten, extend, etc., one or more conditions.

As an example, the system **300** may include one or more firewalls, etc. As an example, a firewall may be configured for sniffing and associating an address with one or more resources behind the firewall. In such an example, the firewall may act to direct traffic (e.g., transmitted certificates) to appropriate destinations behind the firewall. In such an example, an out-of-band process may be performed on a device behind the firewall upon receipt of a packet of information (e.g., a certificate, etc.). As an example, an authentication process may optionally be performed at a firewall. In such an example, an authenticated certificate may be transmitted to an appropriate device behind the firewall to perform an out-of-band process that allows for access to one or more resources, for example, as specified in the certificate or as otherwise specified. In such an example, a plurality of devices may exist behind the firewall where each of such devices may have permission to access one or more specified resources (e.g., access to the one or more specified resources via one of a group of "generic" devices).

As an example, consider data as a resource where the data is stored in one or more storage devices behind a firewall. In such an example, front-end device (e.g., a firewall or other device) may perform an authentication process on a certificate and then direct the certificate to a device that is in a low power state (e.g., a sleep state, even a powered-off state where some power is available to a network adapter) such that an out-of-band process may be performed to "activate" the device for accessing the data as stored in one or more of the one or more storage devices.

FIG. **4** shows an example of a graphical user interface (GUI) **440** as associated with a service such as the service **325** of the system **300** of FIG. **3**. In the example of FIG. **4**, the GUI **440** includes an access management graphic **442**, a security graphic **444**, a contacts graphic **446** and an administration graphic **448**. Each of the graphics **442**, **444**, **446** and **448** may be rendered to a display by a device, for example, as part of a webpage or webpages (e.g., in a browser application).

The access management graphic **442** includes graphical controls for executing various instructions to manage a certificate. For example, a user may create a new certificate, edit an existing certificate, save a certificate, etc. Further, in the example of FIG. **4**, a user may optionally specify one or more of time conditions, resource conditions, user conditions and/or other conditions.

The security graphic **444** includes graphical controls for executing various instructions for wake on LAN (WOL), in-band, out-of-band, firewall, and/or other types of communication related processes. For example, a user may select a "firewall" button and indicate that a device exists behind a firewall and that a certificate may be configured, routed, etc., to handle access to the device behind the firewall.

As an example, a user may select one or more types of communication, for example, optionally depending on knowledge of a state or states of a device. For example, if a device is "on" during certain hours, a certificate may call for an in-band process; whereas, if the device is "off" during other hours, a certificate (e.g., possibly the same certificate) may call for an out-of-band process. In such a manner, a certificate may be tailored to knowledge about a device. As another example, a hierarchy may be established where a first type of communication is attempted (e.g., in-band) followed by a back-up type (e.g., out-of-band).

The contacts graphic **446** includes various graphical controls for accessing, selecting, managing, etc., contacts. As an example, a certificate may be associated with an email, an IM ID, a SKYPE® ID (Microsoft Corp., Redmond, Wash.), a new contact, a group contact, an entity contact, etc. As to an entity contact, it may refer to a device, a system, etc. For example, "my car" may be a contact where the car includes a system that may be in a sleep state and subject to wake-up via an out-of-band process. As another example, consider a production facility with process control equipment where a controller may be in a sleep state. Such a controller may be considered an entity and capable of being woken-up via a process such as an out-of-band process.

As an example, a contact may be associated with contact information for contact via one or more networks such as, for example, including the Internet (e.g., where communication occurs via one or more Internet protocols), a cellular network, a satellite network, etc. As an example, a message may be communicated via a cellular network to a smart phone, a tablet, a notebook computer, a vehicle, a controller, etc. As an example, a device may include a cellular network interface (e.g., network adapter), which may be configured for operation in a low power state and upon receipt of one or more packets wake to allow for remote access to one or more resources available on, through or on and through the device.

The administrative graphic **448** includes graphical controls for managing an account, billing, preferences, etc. Such graphical controls may allow a user to set permission, conditions, etc.

FIG. **4** shows an example of an email **452** that includes a link **454** and optionally a certificate **456**. In this example, a message reads in part "Hi Mom, See the vacation pictures here". In such an example, the recipient of the email **452** may select the link (e.g., the word "here") to launch a remote session to a device to access one or more resources available on, through or on and through the device. As an example, the link may be a URL to a service (e.g., an account associated with the service) or to a device. In either instance, a certificate such as the certificate such as the certificate **456** may be transmitted to the URL or otherwise implemented to gain access.

FIG. **4** also shows an example of a graphical user interface (GUI) **443** for setting one or more time conditions. For example, the GUI **443** may include a start field, an end field, a day(s) field, and a repetition/frequency field. As an example, graphical controls may be provided to assist with entry of information in such fields. As an example, graphical controls may be provided to indicate one or more time zones (e.g., to facilitate setting time conditions for certificate recipients/users in a different time zone).

FIG. **4** also shows an example of a graphical user interface (GUI) **445** for setting one or more resource conditions. For example, the GUI **445** may include a files graphical control, an applications graphical control, and a devices graphical control. A graphical control may also be provided for logic. For example, where a file has a particular file extension associated with an application, selection of the file may automatically select the associated application. In such a manner, a remote user can access the file and use the file on a device, which may be awoken from a sleep state, for example, via an out-of-band process. Referring again to the desktop **340** of FIG. **3**, the GUI **445** may optionally be implemented to determine which icons and associated resources are available (e.g., or unavailable).

FIG. **5** shows an example of a system **500** according to an architecture that includes a processor **510**, a graphics memory controller hub (GMCH) **520** and an I/O controller hub (ICH) **530** as well as memory such as DDR2 RAM **550** and flash memory **560**, and a network connector **580**. In the example of FIG. **5**, a cellular network connector **585** may be included alternatively or additionally to the network connector **580**. As an example, the cellular network connector **585** may include a connection to the network connector **580**. As an example, an out-of-band process may optionally be initiated via a communication received via the cellular network connector **585**. For example, the cellular network connector **585** may sniff packets for particular identifying information (e.g., consider a 3G, 4G, etc., cellular network sniffer).

As shown, the GMCH **520** includes a management engine (ME) that can operate according to ME firmware stored in the flash memory **560**. AMT functionality may be provided according to instructions of the ME firmware (e.g., a firmware image as stored in the flash memory **560**).

As an example, instructions **565** may be included in the flash memory (e.g., to supplement ME firmware) to provide functionality for purposes of a method such as the method **260** of FIG. **2**, the method **360** of FIG. **3**, etc. As an example, such instructions may be implemented as part of an OEM platform. Such functionality may be enabled using a ME BIOS extension such that remote access may occur. In the example of FIG. **5**, the instructions **565** are shown as being "wake on cloud" instructions, which may, for example, allow for waking the system **500** from a sleep state or, more generally, transitioning the system **500** from a higher state (less power) to a lower state (more power) and optionally vice-versa (e.g., at the end of a session, expiration of a certificate, etc.).

As an example, on power-up, the ME firmware image in the flash memory **560** may be copied into the DDR RAM **550-1** or **550-2**. The ME firmware may execute on the processor **510**, for example, and use a portion of the DDR RAM (e.g., Slot 0) for storage during execution. In such an example, DDR RAM Slot 0 must be populated and powered on for the ME firmware to run.

As to the ME data, it may include, for example, OEM-configurable parameters; setup and configuration parameters such as passwords, network configuration, certificates, and access control lists (ACLS); other configuration information, such as lists of alerts and System Defense policies; and a hardware configuration captured by the BIOS at startup.

As an example, AMT functionality may manage third-party data storage (3PDS), for example, which may be allocated by independent software vendor (ISVs) for local storage of information for their applications.

As shown in the example of FIG. **5**, the flash memory **560** also includes BIOS executable code and executable code ("Gb Net Firmware") for the Gigabit Network Connection **580**.

As an example, the flash memory **560** may be protected against unauthorized host access by a hardware mechanism activated by an OEM during manufacturing.

As an example, the ICH **530** may include filter definitions that are applied to incoming and outgoing in-band network traffic (e.g., message traffic to and from the processor **510**). As an example, such filters may include internally-defined filters and one or more application filters defined by one or more ISVs using system defense and agent presence capabilities.

In the example of FIG. **5**, the Gigabit Network Connection **580** may be configured to identify out-of-band (OOB) network traffic (e.g., traffic targeted to AMT, etc.) and routes it to the ME instead of to the processor **519**. As an example, AMT traffic may be identified by dedicated IANA-registered port numbers.

As an example, the following may interact with AMT:

BIOS to initialize AMT or to reset it to its initial state. For example, it may capture platform hardware configuration information and stores it in NVM so that AMT can make the information available out-of-band.

ICH **530** sensor capability to detect state of various platform sensors, such as, for example, temperatures, fan status, and chassis integrity. As an example, AMT may be configured to store and/or forward an alert when the state of any selected sensor changes or crosses a threshold.

One or more software agents (e.g., written by a management ISV) executing on the processor **510** may register with AMT and report presence to AMT and, for example, to a management console using "heartbeats". In such an example, AMT may monitor heartbeats and take action when there is a problem with agent execution.

ISV applications on the processor **510** may communicate locally with AMT using dedicated drivers, for example, that are compatible with the host operating system.

The system **500** may be a state machine and exist in a state such as one of the states **590**. In the example of FIG. **5**, the states are number S0, S1, S2, S3, S4 and S5. These may be referred to as "sleep states" that describe power applied to the processor **510**. A sleep state may relate to one or more particular hardware components. Where the system **500** is considered to be fully powered up, it is said to be "in S0"; whereas, if the system **500** is in some higher sleep state (i.e., lower power state), it is "in Sx".

As an example, the Advanced Configuration and Power Interface (ACPI) specification defines the following states G0 (S0), G1 (S1-S4) and G2 (S5):

G0 (S0): Working

G1, Sleeping subdivided into four states S1 through S4:

S1 Sleeping State: The S1 sleeping state is a low wake latency sleeping state. In this state, no system context is lost (processor or chipset) and hardware maintains all system context.

S2 Sleeping State: The S2 sleeping state is a low wake latency sleeping state. This state is similar to the S1 sleeping state except that the processor and system cache context is lost (e.g., OS is responsible for maintaining the caches and processor context). Control starts from the processor's reset vector after the wake event.

S3 Sleeping State: The S3 sleeping state is a low wake latency sleeping state where all system context is lost except system memory. Processor, cache, and chipset context are lost in this state. Hardware maintains memory context and restores some processor and L2 configuration context. Control starts from the processor's reset vector after the wake event.

S4 Sleeping State: The S4 sleeping state is the lowest power, longest wake latency sleeping state supported by ACPI. To reduce power to a minimum, it is assumed that the hardware platform has powered off all devices. Platform context is maintained.

G2 (S5) Soft Off State: The S5 state is similar to the S4 state except that the OS does not save any context. The system is in the "soft" off state and requires a complete boot when it wakes. Software uses a different state value to distinguish between the S5 state and the S4 state to allow for initial boot operations within the BIOS to distinguish whether or not the boot is going to wake from a saved memory image.

As mentioned, the instructions **565** as stored in the flash memory **560** may be implemented to transition the system **500** from one state to another state. For example, the instructions **565** may be implemented with Intel® AMT to allow for one or more "wake on cloud" scenarios. As explained with respect to the method **260** of FIG. **2**, such a transition may occur in response to a packet from the "cloud", for example, as provided by a cloud-based service **225**. In such an example, the device **220** may be referred to as a cloud connector as it allows a device to connect to another device through the cloud. As an example the service **225** may be referred to as a cloud connector service.

As explained with respect to the method **360** of FIG. **3**, such a transition may occur in response to a packet from the "cloud", for example, as provided by a cloud-based service **325**. In the example of FIG. **3**, a certificate may be provided that includes information as to one or more conditions (e.g., restrictions, etc.), for example, as explained with respect to the example of FIG. **4**.

As explained with respect to FIG. **1**, in various states, power is supplied to a network adapter to allow it to perform functions such as, for example, sniffing. In such an example, sniffing may be specific for one or more packets originating with a cloud-based service (e.g., a cloud-based connector service). As an example, a cloud-based service may optionally include cellular network equipment for communications over a cellular network. In such an example, a cellular network connector (e.g., adapter) may be provided such as, for example, the cellular network connector **585** of FIG. **5**, which may include sniffing capabilities to monitor packets for identifying information associated with a system such as the system **500** of FIG. **5**.

As an example, a packet may include information such as data that may, for example, be loaded into flash or other memory to instruct a system upon waking to a lower state (e.g., to the G0 (S0) working state). The data may cause an operating system to restrict access to one or more resources, allow access to one or more resources, etc. Some examples of resources are shown, for example, with respect to the resource conditions graphic **445** of FIG. **4**.

FIG. **6** shows an example of a method **600** that includes a reception block **614** for receiving a request via a network interface to access a specified resource associated with a user account; a process block **618** for processing the request received via the network interface to access a specified resource associated with a user account; a decision block **622** for deciding whether to transmit, to a network address associated with the user account, instructions (e.g., commands) for waking a processor from a sleep state and for accessing the specified resource; and a transmission block **626** for, responsive to a decision to transmit the instructions (e.g., commands), transmit the instructions (e.g., commands) via the network interface. In the instance that the decision block **622** decides that transmission is not proper, the method **600** may continue, for example, to the reception block **614** (e.g., to wait for receipt of a request).

As an example, one or more blocks of the method **600** of FIG. **6** may be in the form of one or more computer-readable media that include instruction executable by a processor to instruct an information handling system to process a request to access a specified resource associated with a user account; and to decide whether to transmit, to a network address associated with the user account, instructions (e.g., commands) for waking a processor from a sleep state and for accessing the specified resource. As an example, a server may be an information handling system (see, e.g., the device **220** of FIG. **2**, the device **320** of FIG. **3**, etc.).

As an example, a system may include a processor; a memory device having memory accessible by the processor; a network interface; and instructions stored in the memory and executable by the processor to process a request received via the network interface to access a specified resource associated with a user account; decide whether to transmit, to a network address associated with the user account, commands for waking a processor from a sleep state and for accessing the specified resource; and responsive to a decision to transmit the commands, transmit the commands via the network interface. As an example, such a system may be a server. As an example such a system may be a cloud-based server and, for example, may be referred to as a cloud connection server or, for example, a cloud connector.

FIG. **7** shows some examples of devices **700**, examples of functionality **732**, **734** and **736** and an example of an architecture that includes a wake on cloud layer **750** and a transverse firewall layer **770**. As shown, the devices **700** may include one or more processors **702**, memory **704**, one or more network interfaces **706**, one or more displays **708** and one or more power cells **710**. As shown in FIG. **7**, for example, a cell phone, a tablet, a camera, a GPS device, a notebook computer, or other device may be configured for use with the layer **750** or the layers **750** and **770**, for example, to perform one or more functions such as, for example, the retrieving files functionality **732**, the remote control functionality **734** and running applications functionality **736**.

In the example of FIG. **7**, the layers **750** and **770** are shown with respect to a cloud connector **760** and a cloud relay **780**, respectively. Also shown are devices **721** and **722** and devices **723** and **724**, where the former pair communicate via the wake on cloud layer **750** (e.g., implemented via the cloud connector **760**) and the latter pair communicate via the wake on cloud layer **750** (e.g., implemented via the cloud connector **760**) and the firewall transversal layer **770** (e.g., implemented via the cloud relay **780**).

As an example, the architecture of FIG. **7** may operate without a need for a connector application or agent on a requesting device. For example, the device **721** and the device **723** may request one or more resources of the device **722** and the device **724**, respectively, via a commercially available browser application (e.g., without a specialized connector application or agent on the device **721** or the device **723**).

As an example, the device **723** may communicate with the device **724** by traversing a firewall, for example, without having to establish a connection such as a VPN connection.

As an example, the device **721** and the device **723** may operate through the cloud connect **760** or the cloud connector **760** and the cloud relay **780** to wake a remote device through the cloud (e.g., the device **722** or the device **724**, either of which may be in a sleep state). As an example, a request may result in an application being automatically launched on a remote device. For example, the device **721** may issue a request to access an application on the device **722** where the request causes the application to launch on the device **722** (e.g., to be ready for use by a user at the device **721**).

As an example, a method may include waking a remote device and accessing its resources, such as retrieving files, remotely controlling, and/or remotely launching and controlling applications, from an external device via a browser interface when the remote device is in a low power consumption state (e.g., a power consumption level such as that to power a network adapter such as an on-board network adapter) and behind a firewall.

As an example, a system may allow a person who is not at his or her primary or secondary compute device but needs a file, or information, or needs to run a program that is only installed on one of his or her other compute devices located behind one or more firewalls. As an example, the person may be on another compute device they own, or a 3rd party compute device that they are a guest on. As an example, a system may allow a person to remotely wake up a device and securely gain control of that device from a 3rd party compute device.

As an example, a method may include waking up, tunneling though firewalls and wireless access points, understanding a changing IP address of a compute device, and one or more other tasks.

As an example, a wake on cloud service may allow a user to securely register one or more devices (see, e.g., the devices **700** of FIG. **7**) with a secure registered cloud server to enable a secure remote wake up (e.g., and remote control) of a device from a browser inside or outside a firewall.

As an example, a cloud connector may be a centralized management console. Such a console may be an intermediate entry point for users to gain access and control of their devices. As an example, such a console may include a fixed URL (e.g., www.gaincontrol.com). As an example, a user may access such a site from a browser application (e.g., executing on suitable device). As an example, a user may logon to his or her account using an industry standard logon procedure. As an example, a user account may include information to gain control of one or more devices specified in the user account (e.g., where each of the devices is suitable enabled).

As an example, a device or client may include a second processor subsystem such as, for example, the Intel® ME subsystem. The Intel® ME may be configured to be operational in various states such that it can respond to packets sent to it from a centralized management console (e.g., a cloud connector) and, for example, to wake a device from various sleep states. As an example, updates may occur and be tracked by the Intel® ME subsystem as to IP address updates, for example, as a device or devices behind a wireless access point or a home router may be periodically assigned new IP addresses. As an example, a management engine such as the Intel® ME may be aware every time it gets a new IP address. In such a system, when an IP address changes for a device, a management engine may send a secure packet to a centralized management counsel (e.g., a cloud connector) to inform the centralized management counsel of a current IP address for the device.

As an example, a packet may be transmitted to a centralized management counsel (e.g., a cloud connector) from a device that includes a unique identifier for a management engine of the device (e.g., which may be a MAC address, a UUID, etc.) and a current IP address. With such information, a centralized management console (e.g., a cloud connector) may be informed to as to how to contact the device. As an example, a centralized management console may include a table for user accounts and one or more devices for each user account where, upon receipt of a packet, the centralized management console updates the table (e.g., updates a table entry for that compute device with the current IP address).

As an example, a compute device may also have an IP address different from a management engine of the device, which may change periodically (e.g., per a policy, etc.). As an example, the compute device may update a centralized management console (e.g., a cloud connector) responsive to each IP address transition (e.g., for storage by the centralized management console).

As an example, a user account may include a compute device name, an IP address of a secondary "always on" subsystem (e.g., Intel® ME or other), and, for example, an IP address of the compute device. Once a user logs on to a centralized management console (e.g., a cloud connector), the user may indicate which of his or her compute devices (e.g., if more than one is registered) he or she wishes to remotely control. In such an example, the centralized management console (e.g., the cloud connector) may send a request to the device (e.g., to a management engine of the device) where the device (e.g., the management engine) recognizes the request as being associated with the centralized management console (e.g., the cloud connector) and acts on the request by waking up the device. As an example, if one or more credentials may be required to tunnel through a firewall or a router (e.g., a network device, etc.), a centralized management console (e.g., a cloud connector) may be, for example, pre-initialized with such one or more credentials, which may be sent in a packet to a targeted device.

As an example, when a device wakes up it may update its IP address, as appropriate, to a centralized management console (e.g., cloud connector) and proceed with a system boot (e.g., to a state S0). As an example, a management engine may be configured to securely redirect keyboard, video, etc. to a centralized management console (e.g., a cloud connector). For example, the Intel® AMT may provide for such functionality.

As an example, a centralized management console (e.g., a cloud connector) may store logon/pw information for a compute device and remotely send that information to a management engine of a device. In turn, the management engine may emulate a keyboard and enter the logon/pw to complete a system boot (e.g., or appropriate state transition).

As an example, upon a state transition (e.g., a system boot or other wake-up procedure), a centralized management console (e.g., a cloud connector) may transmit to the device the IP address of a 3rd party device so the device can set up a direct connection with the 3rd party device thereby removing the centralized management console (e.g., the cloud connector) from the communication link. In such an example, once the link is established without the central management console being an intermediate party, the 3rd party may, for example, do a remote takeover of the device and access any information and/or run any program from the device (e.g., optionally using a remote desktop protocol such as RDP).

As an example, a cloud connector (e.g., or centralized management console, etc.) may implement a method that can include receiving a request to access a specified resource associated with a user account and, in response to the request, transmitting, to a network address associated with the user account, instructions for waking a system or device from a sleep state and for accessing the specified resource. In such an example, the specified resource may be an application and, for example, the instructions may include an instruction for launching an instance of the application. As an example, a specified resource may be a file, a folder or other resource (e.g., associated with a data storage system, hierarchy, etc.).

As an example, a method may include transmitting information to a firewall configured for granting access to a system or device based at least in part on checking a received network address against a stored network address. In such an example, the information may be in the form of a data packet that includes a network address and, for example, one or more instructions (e.g., one or more instructions for waking a system or device from a sleep state).

As an example, a request may include a certificate, for example, where transmission of the request is contingent on authentication of the certificate. In such an example, the certificate may include one or more restrictions (e.g., conditions, etc.) such as, for example, a time restriction.

As an example, a method can include waking from a sleep state that is defined, at least in part, by power consumption (see, e.g., sleep states such as "SX" states). As an example, a sleep state may be a state where a system or device has power supplied to a network adapter while other circuitry is not supplied by power. In such an example, the network adapter may be configured for sniffing and, in response to such sniffing, issue a command to transition the other circuitry from an off state to an on state (e.g., in part by causing power to be supplied to the other circuitry). As an example, a sleep state may have a low level of power consumption, for example, less than approximately 200 mW as supplied to a network adapter to perform sniffing (e.g., data packet inspection).

As an example, a method can include receiving a unique identifier associated with a system or device. As an example, a method can include receiving an updated network address to update a network address associated with a user account. As an example, a method can include receiving a secure packet that includes a unique identifier associated with a system or device and an updated network address to update the network address associated with the user account.

As an example, one or more computer-readable storage media can include processor-executable instructions to instruct a processor to: process a request to access a specified resource associated with a user account and decide whether to transmit, to a network address associated with the user account, commands for waking a processor from a sleep state and for accessing the specified resource. As an example, instructions to decide whether to transmit the commands may include instructions to decide based at least in part on authentication of a certificate. As an example, instructions to transmit the commands in response to authentication of the certificate.

As an example, a system may be a server such as a cloud server configured to provide a service. As an example, a system may include a processor, a memory device having memory accessible by the processor, a network interface and instructions stored in the memory and executable by the processor to process a request received via the network interface to access a specified resource associated with a user account, decide whether to transmit, to a network address associated with the user account, commands for waking a processor from a sleep state and for accessing the specified resource and responsive to a decision to transmit the commands, transmit the commands via the network interface. In such an example, a network interface may be a component such as a network adapter. As an example, instructions may be included to subject a certificate received with a request to an authentication process (e.g., to make a decision based at least in part on the authentication process).

As an example, a system may include instructions to render a graphical user interface in response to receipt of a request to access a user account. In such an example, the graphical user interface may include one or more control graphics for generating a certificate that includes one or more restrictions (e.g., conditions, etc.) that restrict access to the specified resource.

As an example, a device may include a hypervisor, for example, executable to manage one or more operating systems. With respect to a hypervisor, a hypervisor may be or include features of the XEN® hypervisor (XENSOURCE, LLC, LTD, Palo Alto, Calif.). In a XEN® system, the XEN® hypervisor is typically the lowest and most privileged layer. Above this layer one or more guest operating systems can be supported, which the hypervisor schedules across the one or more physical CPUs. In XEN® terminology, the first "guest" operating system is referred to as "domain 0" (dom0). In a conventional XEN® system, the dom0 OS is booted automatically when the hypervisor boots and given special management privileges and direct access to all physical hardware by default. With respect to operating systems, a WINDOWS® OS, a LINUX® OS, an APPLE® OS, or other OS may be used by a computing platform.

As described herein, various acts, steps, etc., can be implemented as instructions stored in one or more computer-readable storage media. For example, one or more computer-readable storage media can include computer-executable (e.g., processor-executable) instructions to instruct a device.

The term "circuit" or "circuitry" is used in the summary, description, and/or claims. As is well known in the art, the term "circuitry" includes all levels of available integration, e.g., from discrete logic circuits to the highest level of circuit integration such as VLSI, and includes programmable logic components programmed to perform the functions of an embodiment as well as general-purpose or special-purpose processors programmed with instructions to perform those functions.

While various examples circuits or circuitry have been discussed, FIG. **8** depicts a block diagram of an illustrative computer system **800**. The system **800** may be a desktop computer system, such as one of the ThinkCentre® or ThinkPad® series of personal computers sold by Lenovo (US) Inc. of Morrisville, N.C., or a workstation computer, such as the ThinkStation®, which are sold by Lenovo (US) Inc. of Morrisville, N.C.; however, as apparent from the description herein, a satellite, a base, a server or other machine may include other features or only some of the features of the system **800**.

As shown in FIG. **8**, the system **800** includes a so-called chipset **810**. A chipset refers to a group of integrated circuits, or chips, that are designed to work together. Chipsets are usually marketed as a single product (e.g., consider chipsets marketed under the brands Intel®, AMD®, etc.).

In the example of FIG. **8**, the chipset **810** has a particular architecture, which may vary to some extent depending on brand or manufacturer. The architecture of the chipset **810** includes a core and memory control group **820** and an I/O controller hub **850** that exchange information (e.g., data, signals, commands, etc.) via, for example, a direct management interface or direct media interface (DMI) **842** or a link controller **844**. In the example of FIG. **8**, the DMI **842** is a chip-to-chip interface (sometimes referred to as being a link between a "northbridge" and a "southbridge").

The core and memory control group **820** include one or more processors **822** (e.g., single core or multi-core) and a memory controller hub **826** that exchange information via a front side bus (FSB) **824**. As described herein, various components of the core and memory control group **820** may be integrated onto a single processor die, for example, to make a chip that supplants the conventional "northbridge" style architecture.

The memory controller hub **826** interfaces with memory **840**. For example, the memory controller hub **826** may provide support for DDR SDRAM memory (e.g., DDR, DDR2, DDR3, etc.). In general, the memory **840** is a type of random-access memory (RAM). It is often referred to as "system memory".

The memory controller hub **826** further includes a low-voltage differential signaling interface (LVDS) **832**. The LVDS **832** may be a so-called LVDS Display Interface (LDI) for support of a display device **892** (e.g., a CRT, a flat panel, a projector, etc.). A block **838** includes some examples of technologies that may be supported via the LVDS interface **832** (e.g., serial digital video, HDMI/DVI, display port). The memory controller hub **826** also includes one or more PCI-express interfaces (PCI-E) **834**, for example, for support of discrete graphics **836**. Discrete graphics using a PCI-E interface has become an alternative approach to an accelerated graphics port (AGP). For example, the memory controller hub **826** may include a 16-lane (x16) PCI-E port for an external PCI-E-based graphics card. A system may include AGP or PCI-E for support of graphics.

The I/O hub controller **850** includes a variety of interfaces. The example of FIG. **8** includes a SATA interface **851**, one or more PCI-E interfaces **852** (optionally one or more legacy PCI interfaces), one or more USB interfaces **853**, a LAN interface **854** (more generally a network interface), a general purpose I/O interface (GPIO) **855**, a low-pin count (LPC) interface **870**, a power management interface **861**, a clock generator interface **862**, an audio interface **863** (e.g., for speakers **894**), a total cost of operation (TCO) interface **864**, a system management bus interface (e.g., a multi-master serial computer bus interface) **865**, and a serial peripheral flash memory/controller interface (SPI Flash) **866**, which, in the example of FIG. **8**, includes BIOS **868** and boot code **890**. With respect to network connections, the I/O hub controller **850** may include integrated gigabit Ethernet controller lines multiplexed with a PCI-E interface port. Other network features may operate independent of a PCI-E interface.

The interfaces of the I/O hub controller **850** provide for communication with various devices, networks, etc. For example, the SATA interface **851** provides for reading, writing or reading and writing information on one or more drives **880** such as HDDs, SDDs or a combination thereof. The I/O hub controller **850** may also include an advanced host controller interface (AHCI) to support one or more drives **880**. The PCI-E interface **852** allows for wireless connections **882** to devices, networks, etc. The USB interface **853** provides for input devices **884** such as keyboards (KB), mice and various other devices (e.g., cameras, phones, storage, media players, etc.).

In the example of FIG. **8**, the LPC interface **870** provides for use of one or more ASICs **871**, a trusted platform module (TPM) **872**, a super I/O **873**, a firmware hub **874**, BIOS support **875** as well as various types of memory **876** such as ROM **877**, Flash **878**, and non-volatile RAM (NVRAM) **879**. With respect to the TPM **872**, this module may be in the form of a chip that can be used to authenticate software and hardware devices. For example, a TPM may be capable of performing platform authentication and may be used to verify that a system or component seeking access is the expected system or component.

The system **800**, upon power on, may be configured to execute boot code **890** for the BIOS **868**, as stored within the SPI Flash **866**, and thereafter processes data under the control of one or more operating systems and application software (e.g., stored in system memory **840**).

As an example, the system **800** may include circuitry for communication via a cellular network, a satellite network or other network. As an example, the system **800** may include battery management circuitry, for example, smart battery circuitry suitable for managing one or more lithium-ion batteries.

Conclusion

Although various examples of methods, devices, systems, etc., have been described in language specific to structural features and/or methodological acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described. Rather, the specific features and acts are disclosed as examples of forms of implementing the claimed methods, devices, systems, etc.

What is claimed is:

1. A method comprising: receiving a request at a server to access a specified resource associated with a user account wherein the request comprises a certificate; authenticating the certificate; in response to the request and authentication of the certificate, accessing instructions from memory associated with the server and transmitting the instructions to a network address associated with the user account, wherein the instructions comprise instructions for waking a computing system or device from a sleep state and for accessing the specified resource, wherein the specified resource comprises an application and wherein the instructions comprise an instruction for launching an instance of the application within an operating system environment of the computing system or device woken from the sleep state.

2. The method of claim **1** wherein the application comprises an executable file.

3. The method of claim **1** wherein the transmitting comprises transmitting to a firewall configured for granting access to a system or device based at least in part on checking a received network address against a stored network address.

4. The method of claim **1** wherein the certificate comprises one or more restrictions.

5. The method of claim **4** wherein the one or more restrictions comprise a time restriction.

6. The method of claim **1** wherein the sleep state comprises a sleep state defined by power consumption.

7. The method of claim **1** comprising receiving a unique identifier associated with the system or device.

8. The method of claim **1** comprising receiving an updated network address to update the network address associated with the user account.

9. The method of claim **1** comprising receiving a secure packet that comprises a unique identifier associated with the system or device and an updated network address to update the network address associated with the user account.

10. The method of claim **1** wherein the application comprises at least one file extension that associates files with the application.

11. The method of claim **1** wherein the instructions for waking the system or device from the sleep state comprise at least one instruction for establishing an operating system environment by the system or device.

12. One or more non-transitory computer-readable storage media comprising processor-executable instructions to instruct a processor to: process a request to access a specified resource associated with a user account wherein the request comprises a certificate; based at least in part on an attempt to authenticate the certificate, decide whether to transmit, to a network address associated with the user account, commands for waking a processor from a sleep state and for accessing the specified resource; and responsive to a decision to transmit the commands, transmit the commands via a network interface, wherein the specified resource comprises an application and wherein the commands comprise a command for launching an instance of the application within an operating system environment established at least in part by the processor woken from the sleep state.

13. The one or more non-transitory computer-readable storage media of claim **12** wherein the certificate comprises one or more restrictions.

14. The one or more non-transitory computer-readable storage media of claim **13** wherein the one or more restrictions comprise a time restriction.

15. A system comprising:

a processor;

a memory device having memory accessible by the processor;

a network interface; and

instructions stored in the memory and executable by the processor to process a request received via the network interface to access a specified resource associated with a user account wherein the request comprises a certificate;

based at least in part on an attempt to authenticate the certificate, decide whether to transmit, to a network address associated with the user account, commands for waking a processor from a sleep state and for accessing the specified resource; and

responsive to a decision to transmit the commands, transmit the commands via the network interface, wherein the specified resource comprises an application and wherein the commands comprise a command for launching an instance of the application within an operating system environment established at least in part by the processor woken from the sleep state.

16. The system of claim **15** comprising instructions to render a graphical user interface in response to receipt of a request to access the user account.

17. The system of claim **16** wherein the graphical user interface comprises one or more control graphics for generating a certificate that comprises one or more restrictions that restrict access to the specified resource.

18. The system of claim **15** wherein the certificate comprises one or more restrictions.

19. The system of claim **18** wherein the one or more restrictions comprise a time restriction.

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